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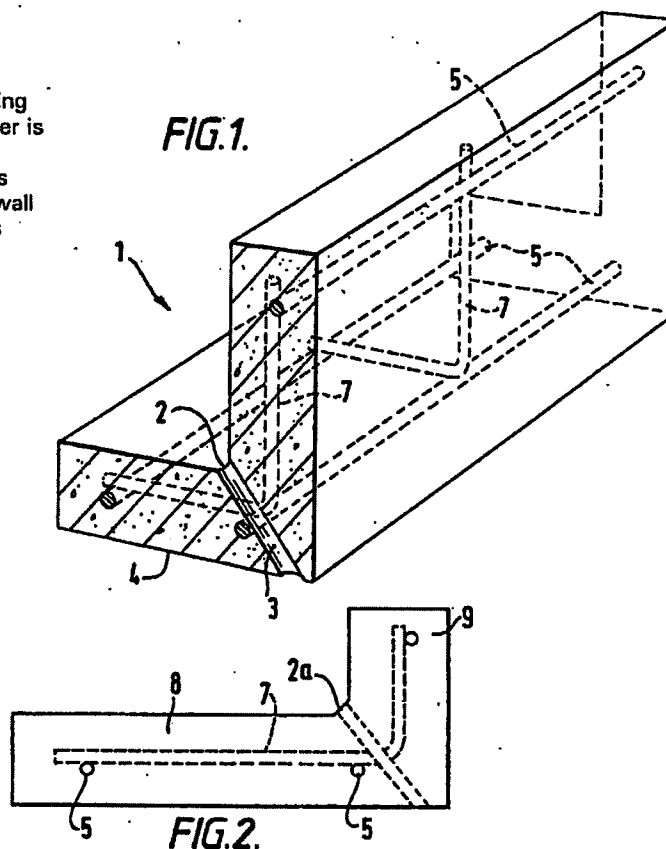
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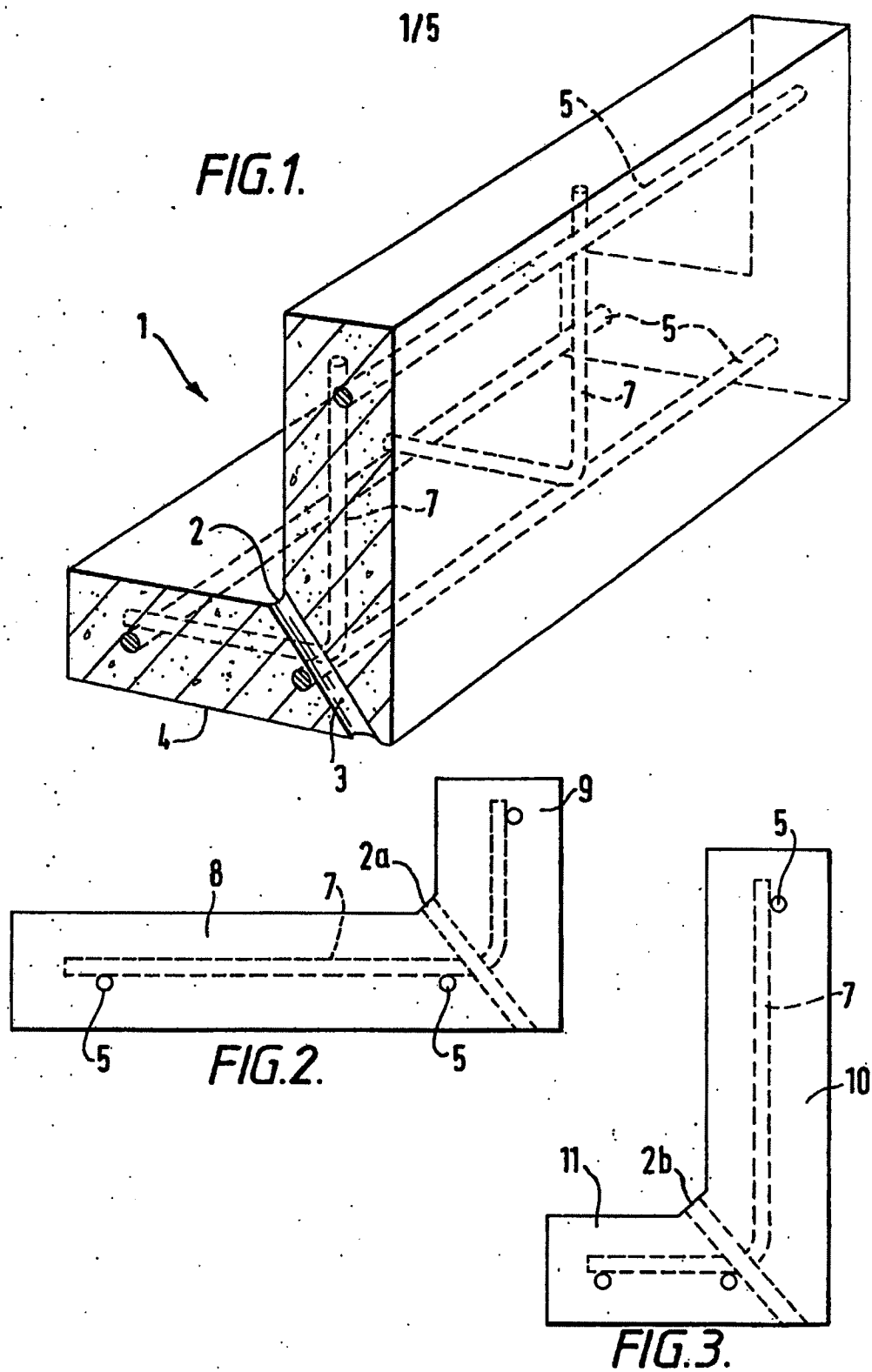
(54) Repairing PRC houses

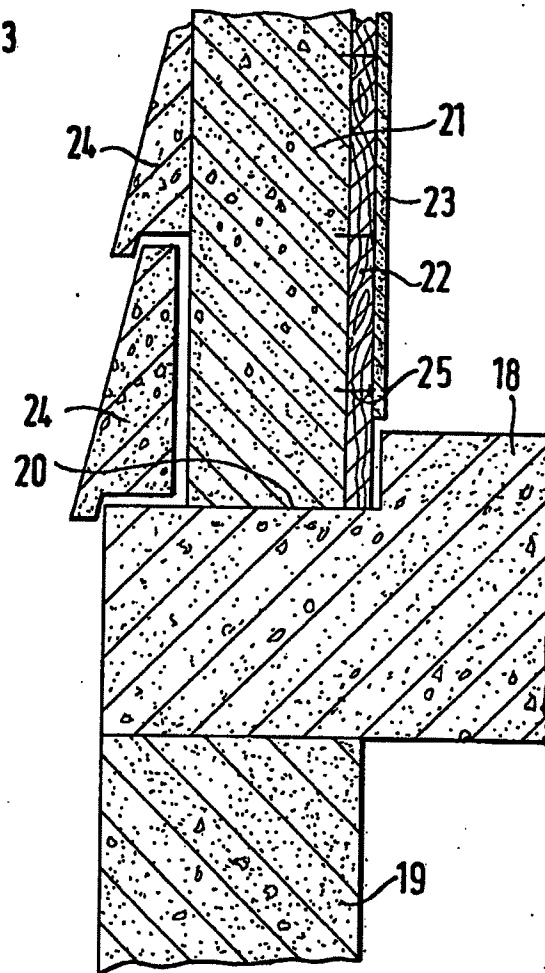
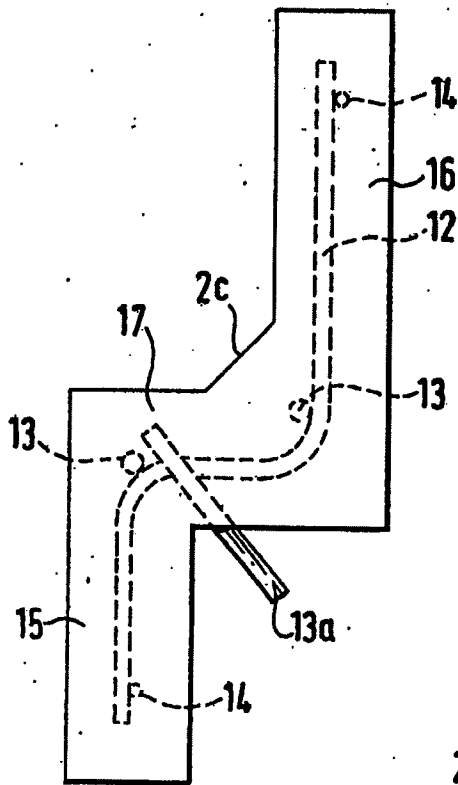
(57) Rigid members 1 are placed around the perimeter of the existing floor of the dwelling. Each member is of L or Z cross-section. The horizontal arm 8 of the L provides support for a replacement outer wall whilst the vertical arm 9 provides support for an intermediate load-bearing blockwork wall.

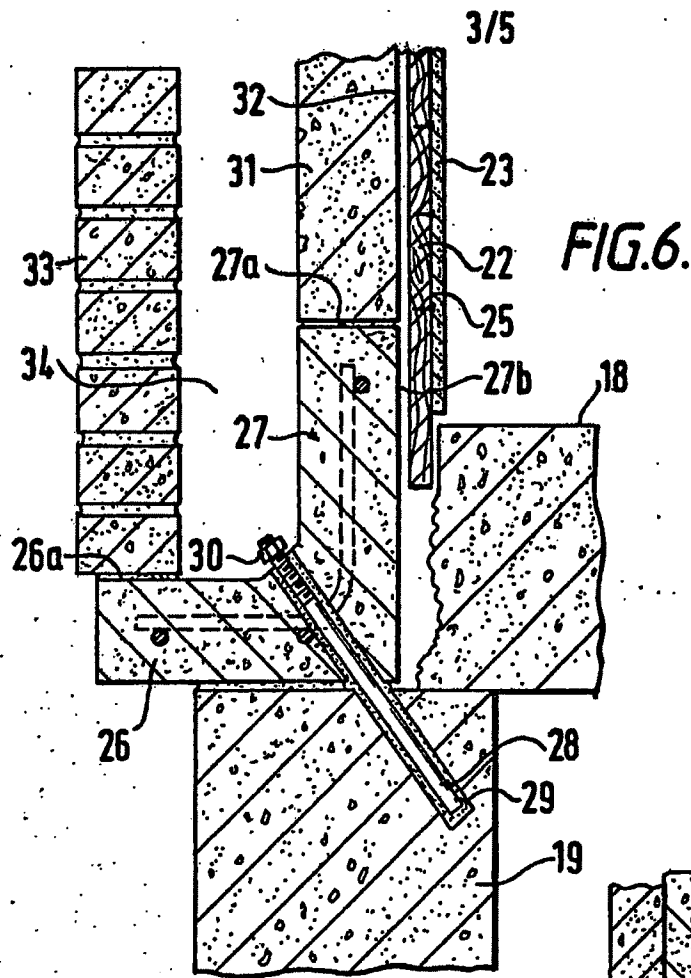


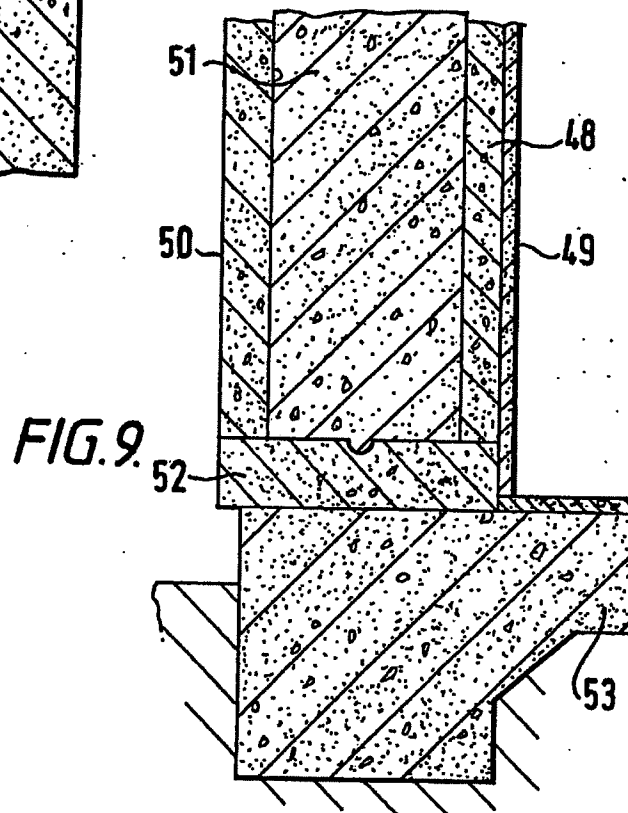
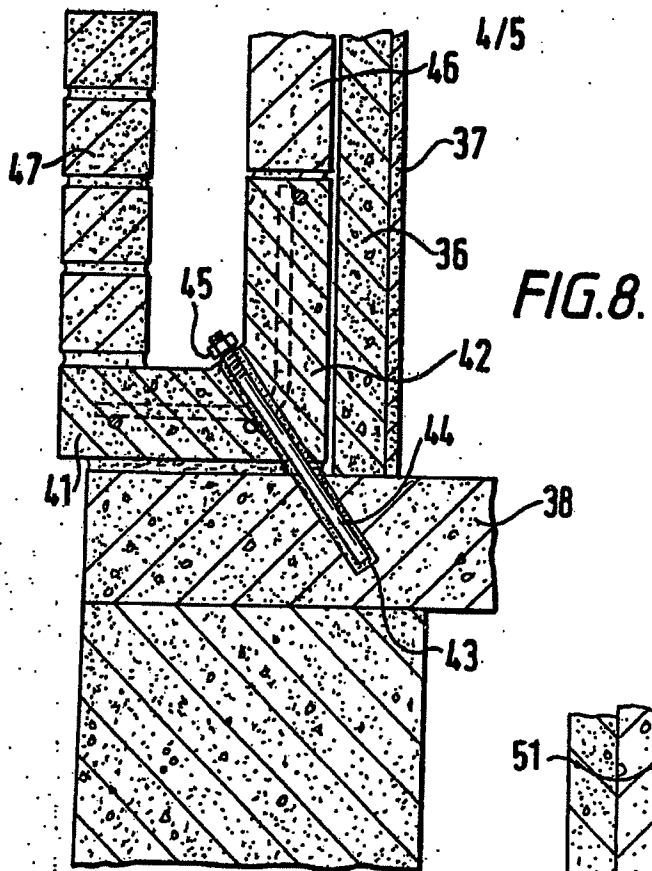
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The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.









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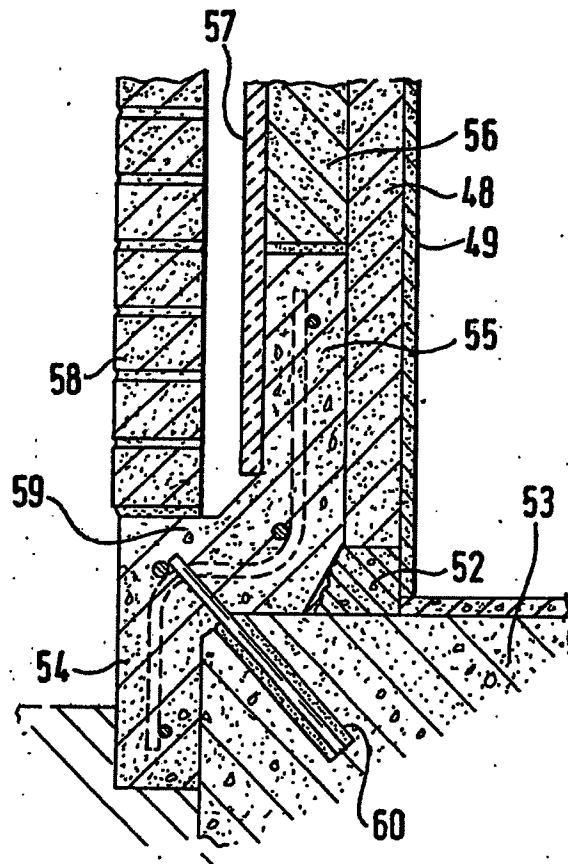


FIG. 10.

SPECIFICATION

Improved house repair

- 5 The present invention relates to a method of repairing prefabricated reinforced concrete (PRC) houses.

PRC houses were built in the post-war period, making use of factory-made pre-cast reinforced concrete units. There were several different types of houses built, including AIREY, 10 UNITY, ORLIT. All these types of houses have the same basic structure, namely a pre-cast concrete ground floor, a number of main frames made from PRC joined together by horizontal secondary beams, again made from PRC, with concrete panels attached between the PRC supports, either forming both an outer wall and an inner wall, or just an outer 15 wall with plasterboard as an inner wall.

Due to failure of the PRC in such houses, resulting from carbonation of the concrete and subsequent rusting of the steel reinforcement embedded in the concrete, it has become 20 necessary to repair these houses. Several methods of repair are possible, depending on the quality of different PRC structures within the house. In some cases the principle reinforced concrete columns of the frames of the houses are still in sound condition, but the 25 quality of the secondary beams is very poor due to the type of cement used.

In the case of an Orlit house, a method for repairing comprises removing the secondary 30 beams spanning the main frame and extending at right angles to the horizontal beams of the main frames beams which extend essentially parallel to the horizontal members of the main frame. The new beams are supported by steel 35 joists extending between the columns of the main frame, and the existing columns are modified by constructing around them piers of engineering brickwork to seat the joists. The existing internal wall is connected to and reinforced by a new blockwork wall which is 40 bonded to the existing wall. This method of repair results in the structural functions of main frame in the gable end wall and in the party wall being taken over by the new blockwork. These main frames are left in position because their removal would cause extensive 45 damage to the internal lining of the house. The third main frame, which runs through the centre of the house and carries the secondary beams supporting the floors, walls, roof and live loads, is unloaded by alternative floor joists which are provided spanning at right angles to the original joists. Support is provided for these new joists by 50 means of a pair of steel joists running between the existing column positions. The function of the piers of engineering brickwork built around the columns in the ground floor is to seat the joists and support them without 55 relying on the existing columns.

In some cases however, the existing vertical columns of the main frames are also in very poor condition and need to be removed completely and replaced by blockwork. If this is 60 done it is necessary to provide structural support at ground floor level to transfer walls, floor and roof loading to the existing foundations, to provide a base for an outer wall, and to replace the need for piers of brickwork at 65 ground level to seat the new floor joists.

According to a first aspect of the present invention there is provided an assembly for use in repairing a prefabricated reinforced concrete dwelling, said assembly comprising a 70 plurality of rigid members for securing in-line around the perimeter of an existing floor or foundation of the dwelling, each rigid member having a first horizontal surface for supporting part of an outer wall to be built around the 75 dwelling, a vertical surface for locating against part of an existing inner wall of the dwelling, and a second horizontal surface for supporting part of an intermediate wall to be built around the dwelling between said outer and inner 80 walls.

Thus, with an assembly of the present invention, a continuous line of rigid members is provided around the dwelling which serves to support an intermediate wall of, for instance, 85 block work which is built in place of the vertical concrete columns of the main frames. The assembly also provides support for an outer wall of, for instance, traditional brickwork, and abutts an existing inner structure of the dwelling, for instance, timber posts attached to 90 plasterboard.

Preferably the or each rigid member includes means for securing the or each rigid member to the existing floor or underlying foundation.

Preferably said means comprises at least one hole which is drilled into the rigid member at an angle to the horizontal for accommodating a bolt.

preferably said bolt is fixed in place within the hole by a quick setting resin.

Preferably the or each rigid member also includes a plurality of reinforcing elements running both longitudinally and transversely within the or each rigid member.

According to a second aspect of the present invention there is provided a rigid member forming part of an assembly as described above.

According to a third aspect of the present invention there is provided a method of repairing a prefabricated reinforced concrete dwelling having a floor or foundation, an outer concrete wall, an inner wall and a plurality of vertical concrete columns, the method comprising removing the outer concrete wall and the concrete columns, placing a plurality of rigid members in-line around the perimeter of the floor or foundation, each rigid member having a first horizontal surface for supporting part of a replacement outer wall, a vertical 120

surface for locating against part of the inner wall and a second horizontal surface for supporting part of an intermediate wall, building a replacement outer wall on said first horizontal surfaces, and building an intermediate wall on said second horizontal surfaces between said inner and outer walls.

Preferably the method includes securing each rigid member to the floor or foundation prior to building the inner and intermediate walls.

This arrangement ensures that the walls, floor and roof loading is transferred to the existing foundations and at the same time provides a seating for the inner and outer walls and removes the need for supporting brickwork.

Embodiments in accordance with the present invention will now be described, by way of example only, with reference to the accompanying drawings in which:-

Figure 1 is a sectioned perspective view of a rigid member in accordance with the present invention showing the internal reinforcing elements;

Figure 2 is an end plan view of one alternative shape of a rigid member in accordance with the present invention;

Figure 3 is an end plan view of a second alternative shape of a rigid member in accordance with the present invention;

Figure 4 is an end plan view of a third alternative shape of a rigid member in accordance with the present invention;

Figure 5 shows a section through part of an Airey house before a repair in accordance with the present invention;

Figure 6 is a section through part of the same house as shown in Fig. 5 after a repair in accordance with the present invention;

Figure 7 shows a section through part of a Unity house before a repair in accordance with the present invention;

Figure 8 shows a section through part of the same house as in Fig. 7 after a repair in accordance with the present invention;

Figure 9 shows a section through part of an Orlit house before a repair in accordance with the present invention; and,

Figure 10 shows a section through part of the same house as in Fig. 9 after a repair in accordance with the present invention.

With reference to Fig. 1 a member 1 in accordance with the present invention comprises a block of material which is substantially L-shaped in cross section and has a chamfered surface 2 running along the length of the member 1 in the region of the inside corner of the L. At intervals along the length of the member 1 there are holes 3 drilled which extend from the chamfered surface 2 to the lower surface 4. Embedded in the member 1 are longitudinal reinforcing elements 5 and also embedded at intervals along the length of the member are L-shaped reinforcing elements

7 which lie above and in front of the longitudinal reinforcing elements 5.

With reference to Fig. 2 an alternative shape of member in accordance with the present invention is provided which is substantially L-shaped in cross section but has a horizontal arm 8 which is longer than a vertical arm 9. A chamfered surface 2a runs along the length of the member in the region of the inside corner of the L.

With reference to Fig. 3 a further alternative shape of a member in accordance with the present invention is provided which has a horizontal arm 11 which is shorter than a vertical arm 10. A chamfered surface 2b runs along the length of the member in the region of the inside corner of the L.

With reference to Figs. 2 and 3 the reinforcing elements 7 are in each case shaped to be similar to the cross sectional shape of the member.

With reference to Fig. 4 a further alternative shape of member in accordance with the present invention is provided which has two vertical arms 15 and 16 extending in opposite directions and connected by a single horizontal arm 17. Reinforcing elements 12 are embedded at intervals along the length of the member which have a shape similar to the cross sectional shape of the member. Longitudinal reinforcing elements 13 and 14 are provided which run along the length of the member, the reinforcing elements 13 lying above and in front of the reinforcing elements 12 and having a larger cross sectional area than the longitudinal reinforcing elements 14 which lie behind the reinforcing element 12. A chamfered surface 2c is provided which runs along the length of the member in the region of the inner corner formed by the meeting of vertical arm 16 and horizontal arm 17. Securing elements 13a are embedded at intervals along the member to allow the member to be secured to the floor or foundation.

Preferred materials for the members shown in Figs. 1 to 4 are pre-cast concrete for the members and stainless steel for the reinforcing elements. Preferably the reinforcing elements are in the shape of rods with substantially circular cross section, and the securing element 13a is a mild steel dowel.

A method of repairing a prefabricated reinforced concrete dwelling in accordance with the present invention will now be described with reference to Figs. 5 to 10.

With reference to Fig. 5 a PRC house of the Airey type has a pre-cast concrete floor 18 resting on foundations 19. The surface 20 of the floor 18 is recessed. Vertical PRC columns 21 forming part of the main frames of the house rest on top of the recessed surface 20. Secured to the inner surface of each vertical column 21 is a piece of timber 22 which is nailed to the PRC column 21 at intervals along the length of the post. Secured to the outside

of the timber 22 is plasterboard 23 which forms the inner wall of the house. On the opposite side of each vertical column 21 there are external cladding panels 24 which extend between adjacent posts, these cladding panels 24 being arranged in an overlapping arrangement to form the external wall of the house.

- With reference to Figs. 5 and 6 in a method of repair in accordance with the present invention the external cladding panels 24 are removed and the vertical posts 21 are removed leaving the timber 22 and plasterboard 23 intact by breaking the concrete of the column 21 away from the nails 25. The ends of the nails 25 are trimmed off level with the outer surface of the timber 22. Next the recessed portion of the floor 18 is removed to accommodate a member in accordance with the present invention which is placed with its horizontal arm 26 lying on top of the foundation 19 and the inner surface 27b of its vertical arm 27 abutting the outer surface of the timber 22. The member is secured in position by drilling a hole 29 in the foundation 19 and inserting a bolt 28 through the member into the hole 29, securing it there with a quick setting resin. A nut 30 is placed on the upper end of the bolt 28 and tightened against the chamfered surface of the member. Further members are installed end to end over all the outer foundations. Next a blockwork wall 31 is built on surface 27a of the vertical arms 27 of the members, which has an inner surface 32 abutting the outer surface of the timber 22. Insulation may be provided in the gap between the surface 32 of the blockwork and the outer surface of the timber 22. An outer wall 33 of bricks or other suitable material is constructed on surface 26a of the outer edge of the horizontal arms 26 of the members, to form the external wall of the house such that there is a cavity 34 between the inner blockwork wall 31 and the outer wall 33.

In this way the structural function of the previous PRC vertical columns are replaced by the blockwork wall 31, the external concrete cladding is replaced by the external wall 33 and the members in accordance with the present invention collectively provide a base for both walls 31 and 33 as well as transferring load to the existing foundations 19. The members may also be adapted to support horizontal joists installed during the repair of the secondary beams.

- 55 A method of repairing a PRC house of the Unity type in accordance with reference to Figs. 7 and 8.

With reference to Fig. 7 this type of house consists of a pre-cast concrete floor 38 resting on foundations 39. PRC columns 40 form the vertical posts of the main frame. Secured to the inner surface of each PRC column 40 and spanning adjacent columns are concrete panels 36. Plasterboard 37 is secured to the inner surface of the concrete panels 36 to

form an inner wall of the house. Outer concrete panels 35 are secured to the outer surface of each PRC column 40, spanning adjacent columns to form an outer wall of the house.

- 70 With reference to Fig. 8, in a method of repair in accordance with the present invention, the external concrete panels 35 are removed as are the PRC vertical columns 40, leaving the inner concrete panels 36 and plasterboard 37 intact. Next a member in accordance with the present invention is placed with the lower surface of its horizontal arm 41 resting on top of the floor 38 and the inner surface of its vertical arm 42 abutting the concrete panel 36. The member is secured in position by drilling a hole 43 in the concrete floor 38 and inserting a bolt 44, through the member and securing it in place with a quick setting resin. A nut 45 is placed on the upper end of the bolt 44 and is tightened against the chamfered surface of the member. Further members are installed end to end over all the outer foundations. Next a blockwork wall 46 is built on top of the vertical arm 42 of the member, the inner surface of the blockwork wall 46 abutting the outer surface of the concrete panel 36. Next an outer wall 47 of bricks or other suitable materials is constructed on top of the horizontal arm 41 of the member, thus forming the external wall of the house. Again the members collectively serve the same purpose as that described previously.

- 100 A method of repairing PRC houses of the Orlit type in accordance with the present invention will now be described with reference to Figs. 9 and 10.

With reference to Fig. 9 a house of this type comprises a concrete raft type floor 53 which includes reinforcing steel, an inner skin 48 of light weight concrete blocks walled into cement mortar having secured to its inner surface plasterwork 49, an outer skin 50 of thick purpose made concrete panels, and vertical PRC posts 51 forming part of the main frames of the house. A concrete plinth 51 rests on top of the concrete floor 53 and provides seating for the walls 48, 50 and the vertical posts 51.

- 115 With reference to Fig. 10 in a method of repair in accordance with the present invention the outer concrete wall 50 and the vertical posts 51 are removed, retaining the inner skin 48 and the plasterwork 49. The existing plinth 52 is cut back to accommodate a member in accordance with the present invention. A member shown in Fig. 4 is placed over the edge of the floor 53 with the lower vertical arm 54 extending below ground level and the upper vertical arm 55 having its inner surface abutting the outer surface of the existing blockwork 48. Next a new thick load-bearing concrete blockwork wall 56 is constructed on top of the upper vertical arm 55 of the mem-

ber such that the inner surface of the wall 56 abuts the outer surface of the existing blockwork 48. The member is secured in place on the concrete floor 53 by drilling a hole 60 into the corner of the floor and inserting a mild steel dowel forming the securing element 13a into the hole, securing it there with quick setting resin. Further members are installed end to end over all the outer foundations. A layer of rigid insulation material 57 may then be secured to the outer surface of the new wall 56 before a new external wall 58 of bricks or other suitable materials is constructed on top of the horizontal sections 59 of the member. Again the members collectively serve the same purpose as that described previously.

It should be appreciated that the particular shape of the members in accordance with the present invention is not important and may be adapted to suit the particular type of house to be repaired, similarly the members may be of any suitable dimensions.

25 CLAIMS

1. An assembly for use in repairing a prefabricated reinforced concrete dwelling said assembly comprising a plurality of rigid members for securing in-line around the perimeter of an existing floor or foundation of the dwelling, each rigid member having a first horizontal surface for supporting part of an outer wall to be built around the dwelling, a vertical surface for locating against part of an existing inner wall of the dwelling, and a second horizontal surface for supporting part of an intermediate wall to be built around the dwelling between said outer and inner walls.

2. An assembly according to Claim 1 in which the or each rigid member includes means for securing the or each rigid member to the existing floor or foundation.

3. An assembly according to Claim 2 in which said means comprises at least one hole which is drilled into the rigid member at an angle to the horizontal for accommodating a bolt.

4. An assembly according to Claim 3 in which said bolt is fixed in place within the hole by a quick setting resin.

5. An assembly according to any of the preceding claims in which the or each rigid member also includes a plurality of reinforcing elements running both longitudinally and transversely within the or each rigid member.

6. A rigid member forming part of an assembly as claimed in any of the preceding claims.

7. A method of repairing a prefabricated reinforced concrete dwelling having a floor or foundation, an outer concrete wall, an inner wall and a plurality of vertical concrete columns, the method comprising removing the outer concrete wall and the concrete columns, placing a plurality of rigid members in-line

around the perimeter of the floor or foundation, each rigid member having a first horizontal surface for supporting part of a replacement outer wall, a vertical surface for locating against part of the inner wall, and a second horizontal surface for supporting part of an intermediate wall, building a replacement outer wall on said first horizontal surfaces, and building an intermediate wall on said second horizontal surfaces between said inner and outer walls.

8. A method according to Claim 6 in which each rigid member is secured to the floor or foundation prior to building the inner and intermediate walls.

9. An assembly according to Claim 1 and substantially as herein described.

10. An assembly substantially as herein described with reference to Figs. 1, 2 and 3 or Fig. 4 of the accompanying drawings.

11. A method according to Claim 7 and substantially as herein described.

12. A method of repairing a prefabricated reinforced concrete dwelling substantially as herein described with reference to Figs. 5 and 6, or Figs. 7 and 8, or Figs. 9 and 10.

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